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New record and update on the geographic distribution of *Enyalius bilineatus* Duméril & Bibron, 1837 (Squamata: Leiosauridae) in Brazil

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Abstract: Herein, we provide the first record of *Enyalius bilineatus* for the Caatinga region, northeastern Brazil, and an updated distribution map based on literature and museum records. We collected two specimens of *E. bilineatus* at Serra do Barbado, northern region of the Espinhaço mountain ridge ("Chapada Diamantina" plateau complex), Bahia, Brazil. This new record extends the known geographic distribution of *E. bilineatus* 716 km, 462 km, and 590 km from the closest known localities in the southwest, southeast, and south, respectively.

Keywords: Caatinga; Chapada Diamantina; highlands; lizards

Leiosaurid lizards are distributed along South America, from southern Amazonia to Patagonia, through Cerrado and Atlantic Forest (Vitt and Caldwell 2014). The genus *Enyalius* currently includes ten species of arboreal to semi-arboreal forest dwellers, associated with tropical and subtropical forests in Brazil (Rodrigues et al. 2014). *Enyalius bilineatus* Duméril & Bibron, 1837 has a relatively broad distribution when compared to other congeneric species, occurring at high elevations in the Atlantic Forest in the states of Rio de Janeiro (Jackson 1978), Espírito Santo (Zamprogno et al. 2001; Teixeira et al. 2005), and Minas Gerais (Vanzolini 1978; Bertoluci et al. 2009; Costa et al. 2009; Sousa et al. 2010; Gomides and Sousa 2012; Moura et al. 2012; Novelli et al. 2012; Borges et al. 2013), and in gallery forests in the Cerrado of Central Brazil (Rodrigues et al. 2006; Nogueira et al. 2011). Lizards of this species are sexually dimorphic in size (females larger than males), sit-and-wait foragers, and feed upon ground arthropods in general, despite their scansorial habits (Zamprogno et al. 2001; Teixeira et al. 2005).

Herein, we provide the first record of *E. bilineatus* for the Caatinga region, northeastern Brazil, and an updated distribution map based on literature and museum records. To build the map, we made an extensive search in the literature in on-line bibliographic databases (Web of Science JSTOR, Scielo, Scopus, and Google Scholar), looking for records of the species. Additionally, we also obtained records in the SpeciesLink database (http://www.splink.cria.org.br) from three Brazilian herpetological collections (UFRM-REP: Coleção de Répteis do Centro de Coleções Taxonômicas da Universidade Federal de Minas Gerais; MBML-Repteis: Coleção de Répteis do Museu de Biologia Professor Mello Leitão; MCP-Repteis: Coleção de Répteis da Pontifícia Universidade Católica do Rio Grande do Sul). All localities with geographic coordinates are in the Appendix. We georeferenced using Google Earth some localities whose geographical coordinates were not provided by authors.

On 6 September 2014, during a fieldwork at the northern region of the Espinhaço mountain ridge ("Chapada Diamantina" plateau complex), Serra do Barbado, Abaíra, Bahia (13.2874° S, 041.8905° W; 1,247 m above sea level), we collected two specimens of *E. bilineatus* (UFRN 4449: male, 71.6 mm SVL, 208.6 mm tail length, Figure 1a; UFRN 4500: female, 72.7 mm SVL, 181.6 mm tail length, Figure 1b). The physiognomy in the area is a mix of *campos rupestres* and cerrado vegetation. We found the two lizards on the leaf litter under shrubs. We identified the specimens as *E. bilineatus* based on the key to species of *Enyalius* presented by Rodrigues et al. (2006). Both specimens presented the following diagnostic characters: infradigital lamellae smooth (Figure 2a), ventral scales keeled (Figure 2b), a distinctive and enlarged subocular present (Figure 2c), canthus

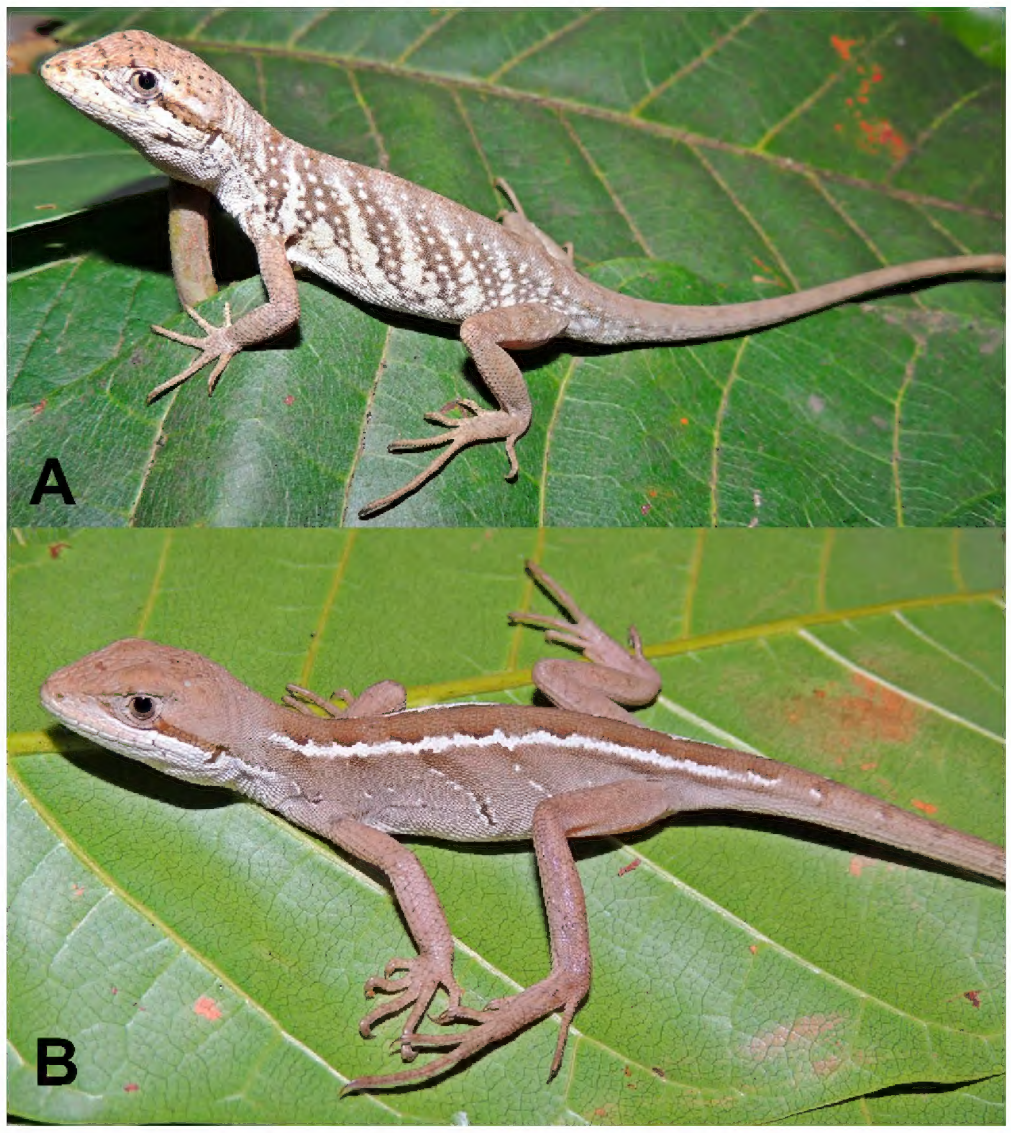

Figure 1. Specimens of *Enyalius bilineatus* collected in the Serra do Barbado, Abaíra, Bahia, Brazil. **A**: UFRN 4449, male, 71.6 mm SVL. **B**: UFRN 4500, female, 72.7 mm SVL).

rostralis straight (Figure 2d), and tail longer than 2.4 times SVL (2.9 times in UFRN 4449 and 2.5 times in UFRN 4500). We identified the sex of specimens by direct examination of gonads. Their distinct coloration (Figure 1) indicates the existence of color polymorphism in the population, but is probably not related with sexual dichromatism, which is considered to be absent in this species (Rodrigues et al. 2006). Specimens were collected under permanent permit number 12734-1, issued by Sisbio/ICMBio, and were housed in the Herpetological Collection of the Universidade Federal do Rio Grande do Norte (voucher numbers: UFRN 4499–4500). M.T. Rodrigues verified the identification of both specimens.

We found 25 records in the literature in the states of Goiás, Espírito Santo, Minas Gerais, Rio de Janeiro, and Distrito Federal (Figure 3; Appendix). Additionally, we also obtained 18 localities from the SpeciesLink database (Figure 3; Appendix). Most records are concentrated in the Atlantic Forest of Minas Gerais. Some authors (e.g., Nogueira et al. 2011; Guedes et al. 2014) advise not to use occurrence data from electronic databases in studies on geographic distribution without careful examination of deposited vouchered material, so we differentiate in the map occurrence points in the literature and SpeciesLink

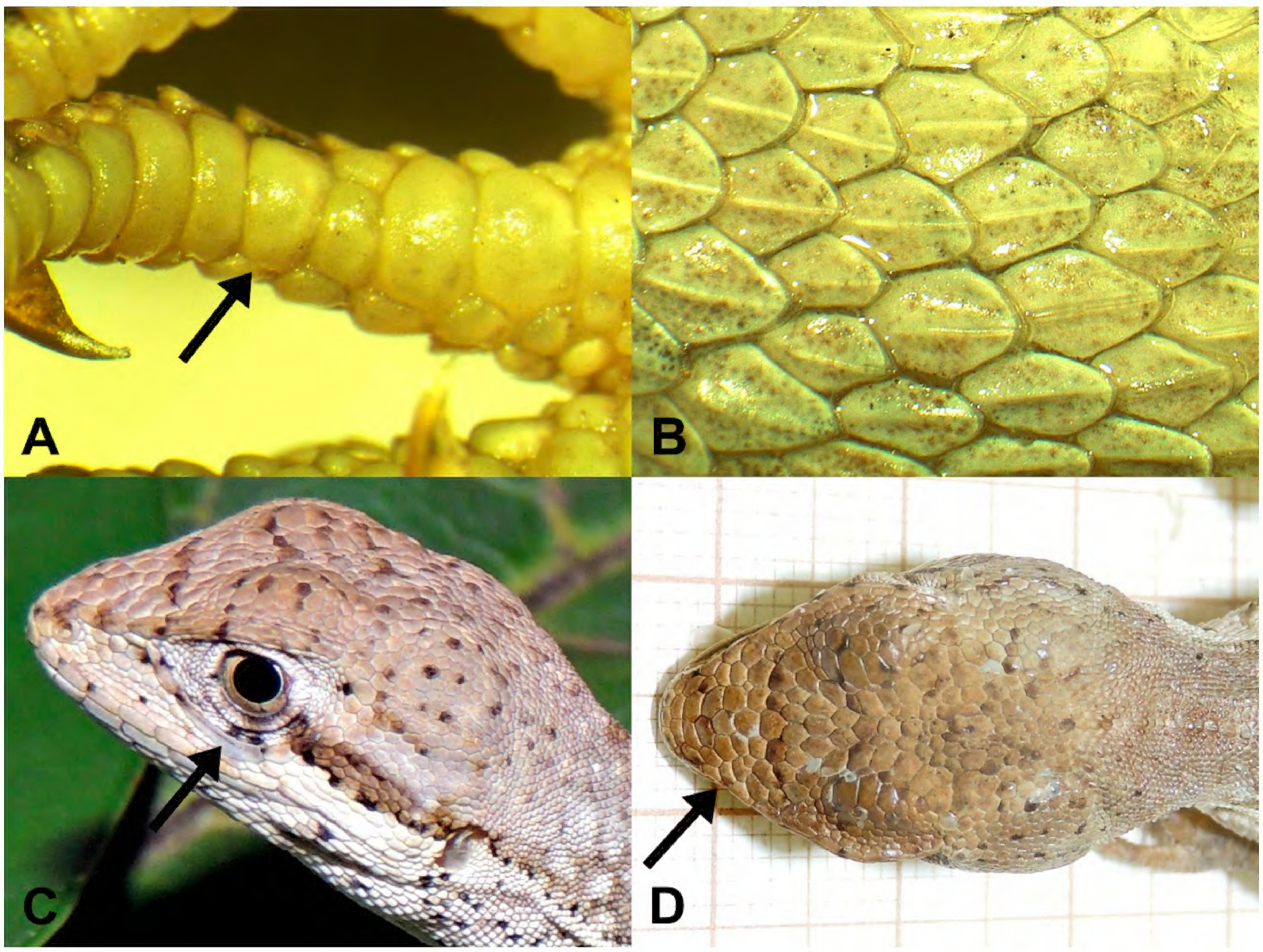

Figure 2. Partial views of UFRN 4449, showing some diagnostic characters of *Enyalius bilineatus*: (**A**) fourth finger of right hindlimb, showing infradigital lamellae smooth; (**B**) ventral view of midbody, showing ventral scales keeled; (**C**) lateral view of the head, showing a distinctive and enlarged subocular present; and (**D**) dorsal view of the head, showing canthus rostralis straight.

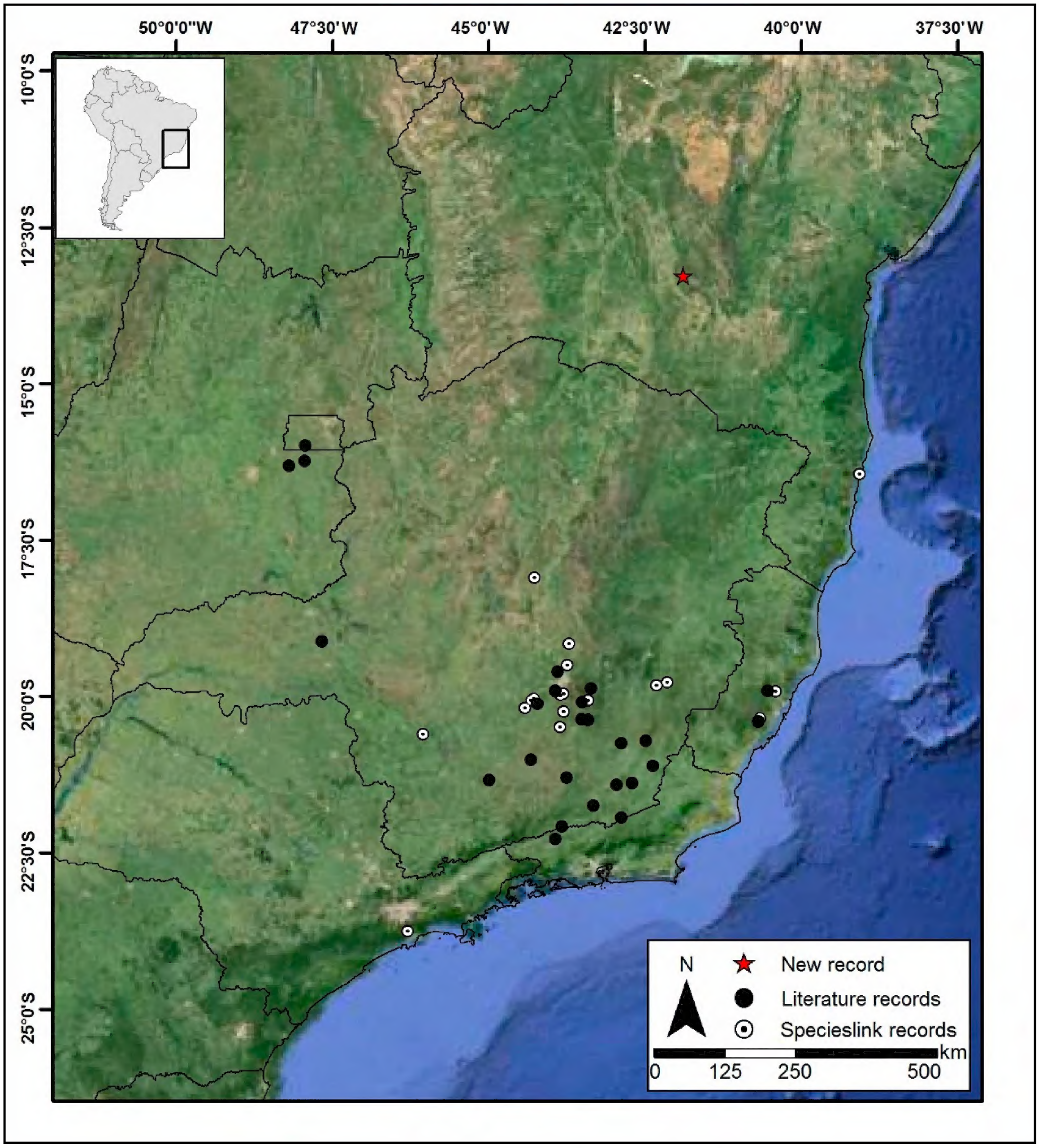

Figure 3. Geographic distribution of *Enyalius bilineatus* in Brazil. Locality names and coordinates are in the Appendix.

database from those obtained by us in the field (Figure 3).

This new record extends considerably the known geographic distribution of *E. bilineatus*, and is the first published record for the species in the Caatinga. The Serra do Barbado is 716 km from Brasília, Distrito Federal (Cerrado), the closest known locality southwestward, 462 km from Porto Seguro, Bahia (Atlantic forest), the closest known locality southeastward, and 590 km from Augusto de Lima, Minas Gerais (Cerrado), the closest known locality southward. The Chapada Diamantina plateau has many relictual ecosystems, including *campos rupestres*, gallery forests, and other phytophysiognomy of cerrado, suggesting a past contact between the Cerrado and Atlantic Forest (Juncá et al. 2005). The occurrence of *E. bilineatus*, which was previously known to occur in the Cerrado and Atlantic Forest, in the Chapada Diamantina is similar to the distribution pattern found for some snake species in highland areas

of the Caatinga (Guedes et al. 2014). These relatively restricted and isolated highland areas are critical for understanding herpetofaunal diversity patterns in the Caatinga, and historical processes influencing their differentiation (Guedes et al. 2014).

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APPENDIX

Geographic coordinates (latitude and longitude in decimal degrees) of the literature records for *Enyalius bilineatus*.

BRAZIL: Bahia: Arraial D'Ajuda, Porto Seguro (16.4497° S, 039.0647° W; SpeciesLink database, MBML-Répteis 1023–1024); Serra do Barbado, Abaíra (13.2874° S, 041.8905° W; this study); Distrito Federal: Brasília, Brazilian Navy Training Area (16° S, 047.9333° W; Nogueira 2011); Goiás: Luziania (16.248° S, 047.945° W; Bertolotto 2006); UHE Corumbá IV (16.3206° S, 048.1879° W; Rodrigues et al. 2006); Espírito Santo: Alto Rio Saltinho, Santa Teresa (19.916° S, 040.533° W; Teixeira et al. 2005; Campinhos, Domingos Martins (20.3633° S, 040.6591° W; SpeciesLink database, MBML-Répteis

2020); Goiapabu Açu, Fundão (19.9325° S, 040.4066° W; SpeciesLink database, MBML-Répteis 683); Sítio 3 Marias, Alto Santa Maria, Marechal Floriano (20.4127° S, 040.683° W, Zamprogno et al. 2001; Minas Gerais: Antônio Carlos (21.31° S, 043.75° W; Jackson 1978); Belo Horizonte (19.923° S, 043.933° W; Bertolotto 2006); Benjamim Constant (21.947° S, 042.874° W; Jackson 1978); Bom Jesus do Galho (19.8289° S, 042.3161° W; SpeciesLink database, UFMG-REP 487); Brumadinho (20.128° S, 044.214° W; Borges et al. 2013); Capitólio (20.615° S, 046.05° W; SpeciesLink database, MCP-Répteis 18854); Catas Altas (20.0747° S, 043.4075° W; SpeciesLink database, UFMG-REP 485, 1129–1130); Congonhas (20.4997° S, 043.8578° W; SpeciesLink database, UFMG-REP 1049, 1730–1731, 2025–2026); Estação Ambiental de Peti (19.883° S, 043.358° W; Bertoluci et al. 2009); Fazenda Serra do Cabral Azul, Augusto de Lima (18.1092° S, 044.2669° W; SpeciesLink database, UFMG-REP 1638, 1640–1641); Fragmento Oswaldo, Caratinga (19.7897° S, 042.1392° W; SpeciesLink database, UFMG-REP 1093, 1607–1608); Juiz de Fora (21.76° S, 043.323° W; Jackson 1978); Lagoa Santa (19.618° S, 043.899° W; Jackson 1978); Mariana (20.382° S, 043.409° W; Jackson 1978; Vanzolini 1978); Muriaé (21.12° S, 042.369° W; Jackson 1978); Nova Lima (19.9856° S, 043.8467° W; SpeciesLink database, UFMG-REP 481, 490, 956); Nova Ponte (19.133° S, 047.666° W; Bertolotto 2006); Ouro Preto (20.377° S, 043.512° W; Jackson 1978); Parque Estadual da Serra do Brigadeiro (20.716° S, 042.482° W; Moura et al. 2012); Raposos (19.9672° S, 043.8042° W; SpeciesLink database, UFMG-REP 1953, 1955–1958); Reserva Biológica Unilavras-Boqueirão (21.346° S, 044.991° W; Novelli et al. 2012); Rio Preto (22.086° S, 043.829° W; Jackson 1978); Ritápolis (21.027° S, 044.32° W; Sousa et al. 2010); RPPN Alto da Boa Vista, Descoberto (21.424° S, 042.953° W; Gomides et al. 2012); Santana do Riacho (19.1689° S, 043.7144° W; SpeciesLink database, UFMG-REP 489); Sereno, Cataguases (21.391° S, 042.703° W; Jackson 1978); Serra Azul, Igarapé (20.0703° S, 044.3017° W; SpeciesLink database, UFMG-REP 1381, 1730, 1852, 1854, 1857, 1867); Serra Azul, Itataiuçu (20.1967° S, 044.4211° W; SpeciesLink database, UFMG-REP 903, 1847, 1866); Serra Azul, São Joaquim de Bicas (20.0492° S, 044.2739° W; SpeciesLink database, UFMG-REP 1855–1856); Serra da Moeda, Itabirito (20.2533° S, 043.8014° W; SpeciesLink database, UFMG-REP 1910); Serra do Caraca, Santa Bárbara (20.1° S, 043.5° W; Jackson 1978); Serra do Cipó, Jaboticatubas (19.5136° S, 043.745° W; SpeciesLink database, UFMG-REP 480); Viçosa (20.756° S, 042.871° W; Jackson 1978; Costa et al. 2009); Rio de Janeiro: Conservatória (22.291° S, 043.931° W; Jackson 1978); São Paulo: Parque Municipal Águas de Paranapiacaba, Santo André (23.7691° S, 046.2954° W; SpeciesLink database, UFMG-REP 886).